

I. **Application for permit for scientific research under the Marine Mammal Protection Act and for scientific purposes under the Endangered Species Act**

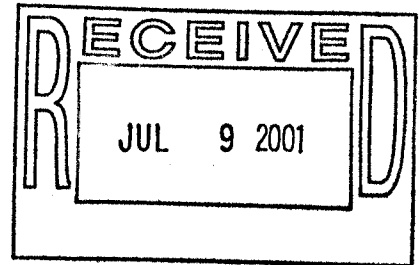
II. **Date of application:** 3 July 2001

III. **Identity of the applicant:**

A. Applicant Holder, Principal Investigator, and other Personnel

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Aerial Observer  
Aleutians East Borough Resident  
TBD

Aerial Observer  
Aleutians East Borough Resident  
TBD

Vessel Observer  
Aleutians East Borough Resident  
TBD

Vessel Observer  
Aleutians East Borough Resident  
TBD

B. Qualifications and Experience

Kate Wynne has been involved in pinniped population assessments since 1981, first as a University of Maine researcher (1981-1987), then as faculty at the University of Alaska

Fairbanks (UAF, 1988-present). She has twenty years experience flying aerial surveys to assess abundance and distribution of harbor seals (*Phoca vitulina richardsi* and *P.v. concolor*) and Steller sea lions (*Eumetopias jubatus*). She has assisted Alaska Department of Fish and Game (ADFG) and NMFS marine mammal researchers in the observation, capture, handling, and dietary studies of these species throughout Alaska. Since 1999, she has been a Principal Investigator on UAF's Gulf Apex Predator project, responsible for conducting monthly aerial Steller sea lion surveys and scat collections in the Kodiak Archipelago [as Co-Investigator under NMML's Permit No. 782-1532-00]. She is also collaborating with several North Pacific cetacean researchers in the study of humpback and killer whale photo-identification and stock identification research [Co-Investigator on Scientific Research Permits Nos. 473-1433 (J. Straley) and 774-1437 (SWFSC)]. She is an authorized member of NMFS' Alaska Marine Mammal Stranding Network and Whale Disentanglement Team, is author of two field guides to marine mammal identification, and provides marine mammal data collection training to NMFS' Alaskan groundfish and gillnet fishery observers. See attached CV.

Glenn Merrill is the Chief Resource Analyst with the Aleutians East Borough. He holds a Masters of Marine Affairs from the University of Washington and a Bachelor's of Arts in biology from the University of Puget Sound. He has been employed in marine resource management since 1991. He has collected biological data aboard groundfish vessels in the North Pacific (1991), and served as the Principal Investigator for field research on Non-Indigenous species conducted in Washington State (1995-1996). He has direct experience with the study area, local residents, and familiarity with the basic components of field research. See attached CV.

The aerial observers will assist in tracking progress, spotting haulouts and rookeries and recording data. Given flying conditions in the region, two observers will be helpful.

The vessel observers will provide local information on approaches to haulouts and rookeries, provide access to haulout sites, and assist in data recording and scat collection. Two observers will facilitate data collection, particularly scat collection.

#### **IV. Proposal**

##### **A. Summary**

The decrease in long-term abundance of the western stock of Steller sea lions (*Eumetopias jubatus*) has resulted in its listing as endangered under the Endangered Species Act. These management measures are based on declining population indices and the possible risk that localized depletion of key groundfish resources may adversely impact the recovery of this species. Accurate and precise population indices are necessary to measure the rate of decline or future recovery of the Steller sea lion population. Information on patterns of prey consumption is a necessary component to

test the validity of the localized depletion hypothesis.

This proposal will improve the accuracy and precision of population indices through expanded aerial and vessel surveys in the western Gulf of Alaska. This proposal seeks to provide additional information on seasonal prey consumption by Steller sea lions through scat collection at rookeries and haulouts along the Alaska Peninsula and Eastern Aleutians. This proposal also provides additional platforms of opportunity to observe Steller sea lion behavior and resight animals branded under National Marine Fisheries Service research programs. This research will directly address the possible causes for the decline in the Steller sea lion population and can provide data that will aid in its recovery.

## **B. Introduction**

### **1. Hypothesis/Objectives**

Despite the fact that severe sea lion declines have been documented throughout the Western Gulf of Alaska (Sease and Loughlin 1999), Steller sea lion research in the Western Gulf of Alaska region, and the Eastern Aleutians as a whole, has largely been limited to periodic aerial surveys and pup counts by the Alaska Department of Fish and Game (ADF&G) and federal agencies, specifically the National Marine Mammal Laboratory (NMML). Recently, as Steller sea lion research has intensified in the Unimak Pass (to the west) and Kodiak (to the east) areas, collection of data from the transition area between these areas has become increasingly critical.

This research would improve the accuracy and precision of aerial survey data. Declines in the western stock of Steller sea lion abundance have been determined by analyzing the long-term trend in aerial survey abundance at select trend sites (Sease and Loughlin 1999). A preliminary review of the available survey data suggests that the population of Steller sea lions along the Alaska Peninsula and Eastern Aleutians is relatively stable or declining at a lower rate than the population of the western stock as a whole (Sease and Loughlin 1999, Sease 2000). The factors behind this potentially lower rate of decline, or population stability, are unknown. Additionally, this finding is based on analyzing the limited data available from the annual summer surveys conducted by NMML. Additional survey data would further clarify the accuracy of this analysis.

Currently, NMFS monitors Steller sea lion trends by flying a single survey over haulouts and rookeries through western Alaska during June or July (Sease and Loughlin 1999). They do not enumerate those animals at sea during the survey. Reviews of this survey program note that a single survey, even when made during the most stable attendance period, only produces an estimate of the number of animals present during the survey and does not provide a measure of variability necessary for statistical analysis (NMFS 1992). Replicate surveys at given haulouts are used by other pinniped researchers to assess daily

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North Pacific Ocean. They reach sexual maturity at 3-10 years, are polygynous, breed and give birth on 'rookeries', and wean their pups at 1-2 years of age. They range from California to Japan but the bulk of their population is centered in the Gulf of Alaska and Aleutian Islands (Loughlin et al 1987, Pitcher 1981). Steller sea lion numbers declined precipitously from 1960 to 1989, prompting their listing as 'threatened' range-wide under the U.S. Endangered Species Act (ESA) on 26 November 1990 (55 Federal Register 49204). Two stocks are currently recognized in U.S. waters, separated into eastern and western stocks at 144° west longitude on 4 May 1997. In 1997 the western stock was listed as "endangered" under the ESA, whereas the eastern stock remains classified as "threatened" (62 Federal Register 24345). The species also is listed as "depleted" under the MMPA. This species is not listed under CITES.

Recent surveys by the National Marine Fisheries Service (NMFS) have documented declines in the abundance of Steller sea lions in southwest Alaska over the past decades (Sease et al. 1992, NMML 1995, Strick et al. 1997). The 2000 population estimate for Steller sea lions in the U.S. is roughly 32,000 animals in Alaska and 6,555 in Oregon-California (Sease 2000, NMFS 2000a). Numbers of non-pup sea lions in the western Alaska stock declined an average of 4.0% per year during 1991-2000 and 13.8% between 1998 and 2000 (Sease 2000). The Southeastern Alaska stock of Steller sea lions is increasing in size with a 12.3% increase in population from 1990-1998 (NMFS 2000a). From 1990-2000 the population in the Western Gulf of Alaska has maintained a fairly stable population relative to other regions within the Gulf of Alaska with a 14% decline from 1991-2000 (Sease, 2000). However, the population has decreased dramatically since 1998, with an estimated loss of 22% of its population since 1998 (Sease 2000). Numbers in the continental U.S. appear stable after a period of decline. The total population appears to be well below carrying capacity (K) and the maximum net productivity level (MNPL).

In December 1998, the National Marine Fisheries service published the first of several Biological Opinions assessing the potential for jeopardy to the Western stock of the Steller sea lion population or adverse modification of critical habitat due to groundfish commercial fishing operations managed by the National Marine Fisheries Service (NMFS, 1998). This biological and subsequent biological opinions have found jeopardy and adverse modification to critical habitat to the western stock of Steller sea lions. These biological opinions have also recommended reasonable and prudent alternatives (RPAs) to mitigate the potential adverse effects of various groundfish fisheries and avoid a jeopardy or adverse modification finding.

The most recent biological Opinion released in December 2000 proposed a broad suite of RPAs throughout the Gulf of Alaska. In addition to providing management alternatives, the biological opinions also provided a suite of research initiatives to be developed (NMFS, 2000b). Recent funding initiatives by Congress, including \$20,000,000 for the Steller Sea Lion Research Initiative (SSLRI), have greatly expanded research efforts.

This will improve the ability of governmental and non-governmental researchers to ascertain the possible causes of the decline in populations. The research that would be covered under this permit is funded through the Steller Sea Lion Research Initiative.

#### Causative Factors Behind Steller sea lion Decline

Surveys by NMFS/ADF&G conducted since the mid-1970's have documented relatively continuous declines throughout southwestern Alaska. Declines were initially observed in 1975-77 in the eastern Aleutian Islands (Braham et al. 1980). Surveys conducted in 1985 found that the decline had continued in the eastern Aleutian Islands and had spread into other areas of coastal Alaska (Merrick et al. 1987). Annual surveys conducted during 1989-96 disclosed that the declines were continuing but at a slower rate than in the previous decade (Sease et al. 1992, NMML 1995, Strick et al. 1997). All subareas other than southeast Alaska have declined 50% or more since the mid-1970's; however, recent trends indicate that numbers in some subareas have stabilized since 1989 (Table 2).

The proximate cause of decline since the early 1980's appears due to reduced juvenile survival. Modeling by York (1994) found that reductions in juvenile survival could most easily produce the observed declines. This hypothesis is supported by observations conducted at Marmot Island during 1991-96. Of 751 pups branded at Marmot Island during 1987 and 1988, only 151 individuals (20.1%) were resighted as of December 1994, and only 31 of these were resighted more than once. Through the 1997 breeding season, only 14 females have been resighted on a rookery beach with a pup (Chumbley et al. 1997; NMML, unpubl. data). It is assumed that most of the missing animals have died. Observations at other sites during the period also indicated that the number of juvenile animals had declined from the pre-decline period (Merrick et al. 1988). Finally, animals in the central Gulf of Alaska in the 1980's were smaller at age and the mean age was older than prior to the decline (Calkins and Goodwin 1988).

Despite the identification of a likely proximate cause, the ultimate cause of the decline remains unknown. Several candidates have, however, been examined and determined unlikely: redistribution of the population, harvests (commercial or subsistence), predation by killer whales or sharks, pollutant effects, and entanglement in marine debris (Merrick et al. 1987). Disease, though probably a contributing factor, cannot in itself be considered the cause--no widespread, acute epizootics have been observed. The candidate causes have now been reduced to incidental takes in commercial fisheries, shooting by fishermen and others, and changes in the abundance or quality of the prey base. Incidental take has resulted in the death of a large number of animals and was probably important in the early declines, both in the Aleutians and the Gulf of Alaska (Loughlin et al. 1983; Loughlin and Nelson 1986; Perez and Loughlin 1991). However, it does not appear to be a major factor today because the number of takes has declined to low levels. Shooting of sea lions has long been a source of mortality, but is difficult to assess. This too appears to have declined based on observations from the Copper River

Delta (Wynne 1990, Wynne et al. 1992, NMFS files), the one area where shooting has been systematically monitored, and from anecdotal reports from fishermen in other areas.

Reduced abundance of prey, either due to changes in the ocean environment (Hare and Mantua 2000, Anderson and Piatt, 1999) or other unknown factors unrelated to fishing may be a central factor in the decline of Steller sea lions. This may then result in a reduced nutritional plane, which is translated into increased susceptibility to mortality from disease, parasitism, and predation. This would also explain the smaller size at age observed by Calkins and Goodwin (1988). However, the cause of the change in the prey base has not been identified. Similarly, those factors precipitating reduced abundance of prey are unknown though commercial fishing has been identified as a possible cause (NMFS 1998, 2000b)

### 3. Literature Review

Please see Section VII for a list of literature cited.

#### C. Methods

##### 1. Justification:

Under the most recent Biological Opinion (NMFS 2000b), the National Marine Fisheries Service delineated numerous new management measures to restrict commercial groundfish fisheries based on the potential for those fisheries to jeopardize the survival or adversely modify the critical habitat of Steller sea lions. These management measures are based on a review of the existing biological data and the potential risk that the groundfish fisheries may pose to the recovery of Steller sea lions. These management measures have severe implications on the economic and social well-being of numerous fishery dependent communities in the Western Gulf of Alaska (NMFS 2000b). Given the long-term socioeconomic impact of these measures and the lack of a clearly defined factor in the decline of Steller sea lions, additional research is warranted.

Much of the recent Steller sea lion research conducted by NMFS and ADF&G has been directed at investigating the hypothesis that declines have resulted from reduced juvenile survival due to a changed prey base. Studies currently underway to test this hypothesis include the following:

- a. Assessment of juvenile survival through observation of marked animals at Marmot Is.
- b. Assessment of the relative condition and health of the population through blood chemistry (e.g., hematocrits), disease studies, and body size.
- c. Determination of the nutritional content of various prey items.
- d. Identification of food habits by area and season.
- e. Characterization of foraging behavior (e.g., depth of dive and trip duration).

- f. Identification of important foraging areas.
- g. Assessment of seasonal and spatial abundance of prey.
- h. Comparisons of parameters from areas of decline to areas of no decline.

Field and laboratory studies planned by the Aleutians East Borough represent continuation of this research. In particular, this research seeks to provide more detailed information about one critical area of the Gulf of Alaska and the potential source of declines. Compared to other regions throughout the range of the Western stock, the Western Gulf of Alaska has experienced less severe declines in population over the 1990-2000 time frame. Examinations in Kodiak under the auspices of the University of Alaska Fairbanks seek to ascertain the biological health of Steller sea lions in a defined geographic area (Wynne in press). The funding provided through the SSLRI to the Aleutians East Borough follows these ongoing research efforts and seeks to define the potential factors affecting Steller sea lions in a neighboring region.

The primary objectives of the Aleutians East Borough field research presented in this application are to continue monitoring the status of the Alaskan Steller sea lion population and to provide data to help identify causes of the population decline so as to provide for the population's recovery. This research is specifically focused on the Western Gulf of Alaska as defined under Merrick et al. (1987). See Figure 1. This research builds on the research being undertaken in Kodiak as well. the Steller sea lion Recovery Plan (NMFS 1992) with respect to the following objectives as provided for in the Plan:

- a. To monitor status and trend of sea lions.
- b. To monitor health, condition, and vital parameters.
- c. To investigate feeding ecology and factors effecting energetic status.

These field studies are designed to achieve these objectives as those described in the Recovery Plan (NMFS 1992). This research also builds on recent research directives established by the National Marine Fisheries service under the Steller Sea Lion Research Initiative (SSLRI) Program. The research funding for this project is specifically intended to build upon the NMFS research program conducted by the National Marine Mammal Laboratory (NMML), existing research being conducted by Ms. Wynne in Kodiak, and research initiatives described under the most recent biological opinion (NMFS 2000b).

The number of animals that will be affected by this research includes roughly 7,000 animals during each aerial survey, roughly 400 non-pups during scat collection, and 400 pups and non-pups may be disturbed during vessel-based behavioural observations.

The western population of Steller sea lions are listed as endangered under the Endangered Species Act and depleted under the Marine Mammal protection act. This research cannot be conducted on another species because this research is specifically targeted at



improving estimates of abundance of this species and obtaining important dietary data. This data cannot be collected by researching another alternative species or stock.

## 2. Duration of the Project and Locations of Taking

The research project will begin on September 2001 and field research will be completed by June 2004. The location of this research corresponds to the Western Gulf of Alaska as defined by Merrick et al (1987). This includes haulouts and rookeries from Lighthouse Rocks to Rock Island along the Alaska Peninsula (Strick et al., 1997). See Figure 1. This region includes approximately 37 haulouts and rookeries, 15 rookery and haulout trend sites, and four rookeries (Sease 2000, Strick et al, 1997). This research will likely be based out of the City of Sand Point.

- A. Aerial surveys of sea lion adults, juveniles, and pups will be conducted quarterly throughout the Western Gulf of Alaska coastal waters.
- B. Vessel surveys of sea lion adults, juveniles, and pups will be conducted quarterly throughout the Western Gulf of Alaska coastal waters.
- C. Scat collection on 3-4 sites per quarter.

## 3. Types of Taking Involved and Estimate of Numbers of Animals that Would be Taken

Disturbance during surveys will be to animals of both sexes, all ages, and all reproductive statuses. The exact numbers of males, females, and juveniles that may be disturbed is not known. There is no capture, tagging, biopsy sampling occurring during these research activities. Disturbance from this research is limited to vessel and aerial surveys and scat collection at haulouts. Calkins and Pitcher (1992) noted a high degree of variability in sea lion response to vessel and aircraft disturbance. There is often no visible behavioral response by the animals to the aerial survey aircraft (Wynne, pers. comm). At the extreme, vessel approaches to haulouts may be expected to displace sea lions from the haulout to nearby waters for an unknown amount of time following our presence. It is unlikely that this research would cause serious disturbance to sea lions in the Western Gulf of Alaska.

- a. A maximum of 5,000 non-pups and 2,000 pups may be approached by aircraft during each aerial survey conducted in the Western Gulf of Alaska from 2001-2004. A total of 18 aerial surveys conducted quarterly on September 2001, December 2001, March 2002, June 2002 (8) surveys, September 2002, December 2002, March 2003, June 2003, December 2003, March 2004, June 2004. A maximum of 7,000 sea lions of all ages may be disturbed inadvertently by the aircraft during each overflight. It is assumed that the same individual animals may be disturbed once every three months via these aerial surveys.

- b. A maximum of 400 non-pups may be disturbed on haulouts (sites other than rookeries) for collection of fecal material used for food habits analysis during each quarter. There may be pups (<1yr old) present on the haulouts. The exact numbers of pups is uncertain. Scat collection will occur quarterly on September 2001, December 2001, March 2002, June 2002, September 2002, December 2002, March 2003, June 2003, December 2003, March 2004, June 2004. Disturbance will be limited at an individual haulout to no more than one disturbance in any six month period, and depending on the availability of other haulouts that may be approached via skiff, this disturbance would likely be no more often than once every year. It is assumed that at the maximum the same animals may be disturbed no more than once every six months.
- c. A maximum of 400 animals (both non-pups and pups) may be disturbed by behavioral observations from vessels near rookery or haulouts. Vessel-based behavioral observations will occur quarterly on September 2001, December 2001, March 2002, June 2002, September 2002, December 2002, March 2003, June 2003, December 2003, March 2004, June 2004. Disturbance will be limited at an individual haulout or rookery to no more than one disturbance in any six month period.

Presumably, the same animals that are disturbed for aerial surveys would be disturbed during scat collection on haulouts. The disturbance that may occur during vessel surveys for behavioral observations may be the same animals that are disturbed during scat collection at some haulouts. Rookeries would be disturbed only via aerial surveys once every three months\* and via vessel behavioral surveys a maximum of once every six months. Therefore any dual disturbance would be limited to once every six months.

\* Note: rookeries function as rookeries for only the summer quarter, the rest of the time they function as haulouts.

#### **Task 1 - Monitor status and trend of sea lions.**

- 1. Conduct a thorough quarterly survey every year (see Research Tasks 321 and 322 for reference in Recovery Plan (NMFS, 1992))
  - i. Objectives - The status of the Alaskan Steller sea lion population is evaluated based on aerial surveys of adults and juveniles observed on rookeries and haul-outs during June. Pup counts obtained during late June to mid-July provide supplemental information on population status. The objectives of this project are to collect assessment data to determine the population's status in the Western Gulf of Alaska on a quarterly basis. This research also seeks to determine the potential variance that exists among surveys conducted during June.
  - ii. Methods - The original recommendation from the Steller sea lion Recovery Team was to conduct an Alaska state-wide survey every year (Tasks 321 and 322) and a range-wide

survey every fifth year (Tasks 341 and 342). After comprehensive reviews first by scientists at the NMFS Alaska Fisheries Science Center and then by the Office of the Chief Scientist, NMFS, survey protocol was changed to alternate-year Alaska-wide surveys and a four-year schedule for range-wide surveys. The last range-wide survey was conducted in 1998.

Improved aerial surveys could provide additional data necessary to adequately assess the population of Steller sea lions throughout their range and also to quantify the use of Steller sea lion habitat on a seasonal basis. This research would provide additional counts of Steller sea lions during winter months and provide some additional information on seasonal use of habitat.

Survey protocols will be the same as in previous surveys (Sease et al. 1992, Strick et al. 1997). We will survey adult and juvenile Steller sea lions hauled out on rookeries and haulouts in Alaska during 10-30 March, June, September, and December in the Western Gulf of Alaska. These surveys will be flown along the same transect used by the NMML June surveys in this region. Traditionally, the surveys have been flown from east to west, and this methodology would be used for this research. The survey will attempt to cover all of the 37 sites in the area. If weather conditions restrict survey opportunities, the survey will be flown along a transect to incorporate as many of the 15 haulout and rookery trend sites as possible.

Surveys will be conducted daily during the period between 1000 and 1600 local time. Survey aircraft are flown at slow speeds (<100-150 kts), at low (<150-200 m) altitude and close (500 m) offshore. Usually one pass is made on a site, although additional passes are occasionally made. This is the same as the NMML protocol in Permit No782-1532.

These aerial surveys use oblique photography, using hand-held 35mm SLR, motordrive cameras with 70-210mm zoom lens. The Field Coordinator or the Principal Investigator will take the photographs. The Aerial Observers will assist with tracking, photography, and other data collection duties as required. Date and time is recorded on dataforms or directly on the image using a databack. Film is usually Ektachrome 200, shot at around 1/500-1000 shutter speed. We also make a back-up using a high quality digital camera, and a high-resolution 8mm video camera. After the slides are developed, adults and juveniles (but not pups) will be counted from projected images. We will also attempt to analyze and compare results from the digital camera using recognition software. The digital camera and 8-mm video cameras will serve as back-ups if the slides are unusable. We also plan to have a vessel survey a few sites immediately after we count/photo them from the air to test comparability between boat and aerial counts.

These counts will likely be conducted either in Kodiak under the supervision of the Principal Investigator and the Field Coordinator or at another suitable location to be

determined. For the first part of the analysis the survey will compare aerial survey results to similar surveys available from NMFS surveys using a modified Student's t-test as described in Strick et al, (1997):

A second form of aerial survey is designed to measure daily variance surrounding the National Marine Mammal Laboratory's (NMML's) June counts on sea lion trend sites in the survey area. We will be in close communication with NMML researchers conducting aerial surveys in the survey area in June 2002 to determine their planned and actual survey window for the area. Typically, NMML surveys are flown in early or mid-June. We will schedule our June quarterly survey for earlier or later on that same day and will attempt to speak (by VHF radio) with NMML surveyors immediately following their successful completion of the survey area. We will also plan to fly replicate surveys of our study area on the days immediately prior to (four surveys) and after NMML's anticipated survey date (four surveys), following standard protocols. This protocol will allow statistically valid comparisons with the existing NMML survey. From these surveys we will derive maximum and mean counts and variance estimates from up to nine daily counts at each haulout. We will compare our results to those reported by NMML to: (1) determine the number of sites missed by either survey effort; and (2) compare NMML's counts to the 90% confidence limits of our site-specific estimates. The methodology used for this portion of the research is the same as that described for the quarterly aerial surveys.

The analysis of the replicate aerial survey count data will likely be conducted either in Kodiak under the supervision of the Principal Investigator and the Field Coordinator or at another suitable location to be determined. For the first part of the analysis the survey will compare aerial survey results to similar surveys available from NMFS. The statistical tests used are described in Small et al. (2001).

- iii. Expected results - Data from these surveys are used to determine the current status of the sea lion population for evaluation against recovery criteria. These data are also used to evaluate trends by subarea and site to study causes of the decline, and the efficacy of management actions.

## **Task 2 - Monitor health, condition, and vital parameters.**

- 1. Determine sex and age class of animals on shore (Research Task 441 in Recovery Plan (NMFS 1992)) and determine rates of pup production and mortality (Research Task 442 in Recovery Plan (NMFS 1992)).
- 1. Objectives - Changes in the population's sex ratio, age distribution, and pup production on rookeries provide information on the status of the population and source of the decline. For example, a comparison of data obtained in intensive summer long observations conducted at Ugamak Island during the 1970's and 1980's provided the first indication

that juvenile survival had declined in the eastern Aleutian Islands during the period (Merrick et al. 1988). The objective of this study will be to provide further information on the population and age structure through a monitoring of haulouts and rookeries from vessels on a quarterly basis. If necessary, observers will be placed on-shore to observe sea lions and record data.

## ii. Methods

Using contracted vessels, we will undertake activities including resighting of Steller sea lions tagged by NMML and other behavioral observations. Where possible, photographs of killer whales will be taken to facilitate identification and population estimates being undertaken by other researchers. For the purposes of this research, vessels may be approaching rookeries and haulouts. Vessel distance would be based on the bathymetry of the location, but efforts would be made to maintain the maximum distance possible while obtaining necessary observations. Vessel observations would be limited to 3 or 4 haulouts or 1 rookery per quarter and would be expected to disturb less than 400 animals per quarter. The vessels would primarily be looking for branded animals and recording behavior. Given budgetary constraints, we do not anticipate an individual vessel being near a haulout or rookery for more than a two or three day period. The Field Coordinator, Principal Investigator, and two Vessel Observers will make observations.

If possible, observers will be placed ashore to observe behavior from cliffs. On-shore observations would not cause any direct harassment with the Steller sea lions. If appropriate, field teams will be stationed at one or more locations, ideally this will be done during good weather, to minimize potential difficulties of placing and removing observers from the sites. Observations will be made from cliffs above the rookeries with the following data to be recorded:

- 1) Daily counts of sea lions by class--pups (alive and dead), juveniles (ages 1-4), adult territorial males, other adult males, and adult females. Females nursing juveniles shall also be counted.
- 2) Presence of tagged and branded animals.
- 3) Daily attendance observations of branded or tagged or naturally-marked animals to determine times spent at-sea foraging.
- 4) Observations of entangled or injured sea lions.
- 5) Record observations of other marine mammals, and boat or air traffic as seen. Boats within the 3 or 10 nm buffer zones will be noted.

Animals previously marked at the site will be recorded, and the presence or absence of a pup noted. These data will be added to the existing file of data on each of these known animals. These observations will initially be sorted into appropriate categories while on-board the vessel or while at the land-based observing site if that technique is to be used. The recording and analysis of these results will likely be conducted in the Juneau office

of the Aleutians East Borough and reviewed in Kodiak under the supervision of the Principal Investigator.

As much as possible, these vessel surveys will be time to take place after the aerial surveys. This will provide an opportunity to compare observed differences in counts at the same location using different methodologies. This comparison could be useful in future research efforts.

**NOTE: biologists observe sea lions from viewpoints overlooking the rookeries, no animals will be taken by harassment, disturbance, or capture.**

- iii. Expected results - These data will provide an estimate of the general age and sex structure of the population, information on brand and tag resightings, and note any potential killer whale predation at the sites. These data can then be compared with historical data from the sites to evaluate population status.

### **Task 3 - Investigate feeding ecology and factors effecting energetic status.**

- a. Describe foods eaten by sea lions (Research Task 611 in Recovery Plan (NMFS 1992))
  - i. Objectives - Evaluation of the food-limitation hypothesis requires knowledge of food habits by area, season, and sea lion age class. Although the NMML, and other independent researchers have greatly expanded the geographic and temporal scope of food-habits collections during the last several years, numerous gaps persist in our understanding of feeding ecology. The objective of this research is to fill in these data gaps.
  - ii. Methods - Our source of food habits data is from scats (fecal material) collected at haul-outs. We anticipate collecting 400-500 scats at haulouts from the Western Gulf of Alaska region on an annual basis. These scats will be collected on a quarterly basis. We will attempt to collect an equal number of scats during each quarter, roughly 100-125 scats.(March, June, September, December) for assessment of food habits during that time of year. We estimate that we will be able to collect roughly 20-50 scats per location based on past experience (Wynne pers. comm. 2000). This will require collecting scats from roughly 3-4 haulouts per quarter.

Staff will collect only fresh samples; each will be bagged separately, grouped with others from the same site, and frozen for subsequent shipping to University of Alaska Fairbanks' (UAF's) Fishery Industrial Technology Center (FITC) in Kodiak. The scat will be collected by the Field Coordinator, Principal Investigator and, if necessary the two Vessel Observers. The Vessel Observers will assist the Field Coordinator in maneuvering the skiff to the research location. At the Kodiak facility, the scat will be rinsed, dried, and shipped to Pacific Identifications (Vancouver BC) for analysis of identifiable hard parts

(typically cephalopod beaks, bones, and otoliths). The percent frequency of occurrence of each species and diet diversity (Shannon Index) will be calculated from samples collected seasonally on each site.

The scat samples will be maintained for the duration of the study, and if appropriate, transferred to the National Marine Mammal Tissue Bank should the samples be useful to other researchers. The samples will be maintained with the Principal Investigator in Kodiak.

- iii. Expected results – The frequency of occurrence of each prey species will provide an index of the relative seasonal and regional importance of prey utilized by Steller sea lions in this area. These food habits data will then be compared with historical data on prey preferences and prey availability to evaluate the hypothesis that changes may have occurred in prey consumption.

Potential for adverse impact: Small adverse impacts may result from harassment associated with aerial and vessel surveys Using protocols developed over the past decade by NMFS the actual adverse impact should be negligible.

Some animals may move into the water during aerial surveys. To minimize this effect, survey aircraft approach sites, when possible, from a kilometer or more offshore and without banking (the sound change associated with banking increases the likelihood of disturbing animals), and they typically are within hearing range for no more than 1-2 minutes. This protocol has reduced the effects of the approach and usually less than 1% of hauled out animals go into the water (See NMML protocol in Permit No782-1532.

Some animals may move into the water during vessel surveys and/or scat collection. To minimize this effect, researchers will approach the haulout as quietly as the particular geographic conditions permit. Scat collection will occur as quickly as possible to minimize the time spent onshore. Vessel surveys will occur at the maximum distance possible to obtain observations. Where possible, on-shore observations from cliffs or bluffs will be used to gather behavioral data. This approach would not create any disturbance to animals. The Steller sea lion population in the region is accustomed to commercial fishing vessels operating in the area and disturbance is not likely to be a factor. Vessel observations at any one location is likely to be limited to no more than a two to three day period per six month period.

Due to the nature of the research we do not anticipate any pain, suffering, ill effects on foraging, mating, nursing, or other behaviours. The measures detailed in the methodology are designed to minimize contact with animals and the duration of any surveys. These surveys are specifically designed to research Steller sea lion population, nutritional intake, and behavior.

Effects on Other Protected Species: There are not expected to be any incidental takes of other protected species in the area. Other protected species identified in the area are the threatened Steller's eider (*Polysticta stelleri*), and Short-tailed Albatross (*Somateria fischeri*). Neither of these species should be affected by these research activities. Steller's eider are listed as threatened under the Endangered Species Act. This species is found in only very limited numbers along the area of this research (USFWS 2000). None of the areas affected by this research is within critical habitat of Steller's eider (USFWS 2000). Short-tailed Albatross are listed as endangered under the Endangered Species Act. There is no indication that these birds share a distribution or life history or distribution that would be affected by these activities. Short-tailed Albatross have a broad distribution and these activities do not affect any of their nesting or foraging grounds (NMFS 2001). We do not anticipate any interaction with these species

Other protected species present in the region include Northern right whales (*Balaena japonica*), Sei whale (*Balaenoptera borealis*), Blue whale (*Balaenoptera musculus*), Fin Whale (*Balaenoptera physalus*), Humpback whale (*Megaptera novaeangliae*), and Sperm whale (*Physeter macrocephalus*) (NMFS 2000b). All of these species are listed as endangered under the Endangered Species Act. None of these animals are likely to be affected by the research program due to their life history and the nature of the research being conducted. We do not anticipate any interaction with these species.

Researchers may note the presence of killer whale (*Orcinus orca*) presence or predation in the area. However, animals will not be approached during this research and no direct involvement with these animals is anticipated. Killer whales are not listed under the MMPA, but are protected under the act.

Research Proposal and Funding: Attached is the original research proposal and a copy of the letter from NMFS approving funding for the proposal under the SSLRI program.

**a. Description of parts or specimen samples**

This research will not collect parts or specimen samples other than scat samples. Those samples will be collected according to the methodology described above.

**b. Removing animals from the wild/research on captive animals**

This section is not applicable.

**c. Import/Export of Marine Mammals/Marine Mammal Parts**

This section is not applicable

**d. Lethal Take**



This section is not applicable

#### **4. Publication of Results**

The results from this research will likely be presented to the academic community on an interim basis in various fora (e.g., North Pacific Fishery Management Council meetings) as the research is analyzed. Formal publication of the results will occur in peer-reviewed academic journals or as technical memoranda once the research nears completion. The data collected during this research will be shared with other researchers according to data protocols that are established between them and the Principal Investigator.

#### **D. National Environmental Policy Act (NEPA) Considerations**

This research should not require an Environmental Assessment (EA), and Environmental Impact Statement (EIS).

- a. The research does not involve new, innovative, controversial, or experimental equipment or techniques. The methodology used for this research is well-established and is essentially the same research that is used by NMML during their aerial surveys, vessel surveys, and scat collection. The Principal Investigator has extensive research in these research protocols.
- b. Other researchers have already adopted the research techniques being used. These are established techniques.
- c. The location in which the research will be conducted is not identified as having special importance to other marine mammals. While a variety of marine mammals are observed in the region where the research is being conducted (e.g., killer whales, other whale species), this research occurs in regions that are currently exposed to vessel and aerial traffic similar to the one being undertaken in this research. There is no indication that this research would cause additional disturbance to any areas of special importance to other marine mammals.
- d. The proposed activity does not involve unique or unknown risks nor are the effects of the research likely to be highly uncertain. Again, this research uses the same protocols as those developed by NMML to minimize disturbance to marine mammals.
- e. There is some potential risk to human health of the researchers undertaking the aerial surveys, vessel surveys, and collection of scat. However, undertaking the activity during periods of favorable weather conditions can mitigate much of this risk. As with the aerial and vessel surveys conducted by other researchers (e.g., NMML), this research will be tailored to suit the weather conditions that exist at the time of the survey. This flexibility

will reduce the potential risks that may exist. The risks from this research is likely to be commensurate with commercial aviation in the region and similar to the risks from commercial fishing. This research is not expected to be substantially more dangerous than activities regularly undertaken within the region.

f. The activity is not likely to have a significant cumulative effect considering existing and potential activities. The research activities undertaken in the Western Gulf of Alaska for Steller sea lion is limited, particularly when compared to the extent of research activities in other regions (e.g., Southeast Alaska, Prince William Sound, Kodiak). Given the extent of research permitted in those regions, it is clear that the extent of research in the Western Gulf it will have less cumulative effects than the cumulative effects of research already approved by NMFS in other regions. There is no indication that this research will have any significant effects on the species. This research is funded under the SSLRI, a program administered by NMFS. The cumulative effects of research was included in the technical review of this research and similarly approved and funded research proposals. Presumably, if there were any concerns about cumulative effects of this proposal it would not have received funding. The methodology used in this research (described in Section IV) is essentially identical to that currently being used by NMML, and other independent researchers.

Additionally, under the Reasonable and Prudent Alternatives established by NMFS (2000b) there are numerous measures in place to protect Steller sea lions from the cumulative effects of a variety of anthropogenic sources. Disturbance by research is not identified as one of the causative factors impeding the recovery of Steller sea lions nor is it likely to adversely modify critical habitat (NMFS 2000b).

g. This activity will not cause the loss of significant scientific, cultural, or historic resources. This research occurs far from historic and cultural sites.

h. There will not be an adverse effect on endangered or threatened populations or stocks or their habitat. As mentioned in Section IV(C), this research will not affect protected species other than Steller sea lions. Also as previously noted, this research is not likely to cause a great deal of disturbance to Steller sea lions. The form of disturbance is limited principally to aerial and vessel surveys and limited collection activities at haulouts. These activities are not likely to affect Steller sea lions. Disturbance by commercial activities or research has not been identified as a factor limiting the recovery of Steller sea lions in their western range.

i. This activity is not in violation of a Federal, State, or local law for environmental protection.

## **V. Previous and Other Permits:**

#### A. Previous Permits

The principal investigator is listed as a subpermittee under NMML's Permit No. 782-1532-00. She is also collaborating with several North Pacific cetacean researchers in the study of humpback and killer whale photo-identification and stock identification research [Co-Investigator on Scientific Research Permits Nos. 473-1433 (J. Straley) and 774-1437 (SWFSC)].

#### B. Other Permits

No other permits are being sought in connection with the requested research.

### VI. Special Considerations for Applicants Working Abroad (for Exports of Parts/Samples or Live Animals from the United States)

This section is not applicable

### VII. Literature Cited

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- Sease, J.L. and T.R. Loughlin. 1999. Aerial and land-based surveys of Steller sea lions (*Eumetopias jubatus*) in Alaska, June and July 1997 and 1998. NOAA Tech Memo NMFS-AFSC-100. 61pp
- Small RJ, GW Pendleton, and KM Wynne. 1998. Harbor seal population trends in the Ketchikan, Sitka, and Kodiak Island areas of Alaska. pp 7-27 in Harbor seal investigations in Alaska. Alaska Dept. of Fish and Game, Ann rept NOAA Grant NA57FX0367. 190pp
- Small, R.J. 2001. Harbor Seal Investigations in Alaska—Annual Report. NOAA Technical Memorandum Grant NA87FX0300. Alaska Department of Fish and Game, Division of Wildlife Conservation, 333 Raspberry Road. Anchorage, Alaska 99518.
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FAX NO. 9072767589

P. 02

**VIII. Certification**

"I hereby certify that the foregoing information is complete, true, and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under one or more of the following statutes and the regulations promulgated thereunder, as indicated in Section I. of this application:

The Endangered Species Act of 1973 (16 U.S.C. 1531-1543) and regulations (50 CFR 222.23(b)); and/or

The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407) and regulations (50 CFR Part 216); and/or

The Fur Seal Act of 1966 (16 U.S.C. 1151-1175).

I also understand that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties provided under the Endangered Species Act of 1973, or to the Marine Mammal Protection Act of 1972, or the Fur Seal Act of 1966, whichever are applicable."

IX.

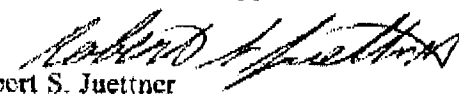
  
Robert S. Juettner  
Borough Administrator  
Aleutians East Borough  
1600 A Street, Suite 103  
Anchorage, Alaska 99501

Table 1.--Proposed Steller sea lion field work during 2001-2004 with maximal numbers of expected takes, locations, and dates.

Potential take by Research Task	Approach	Harassment	Location	Date
Task 1. Monitor status and trends				
Aerial non-pup survey	7,000 (Approximately 5,000 non-pups, 2,000 pups)		WGOA	Quarterly
2001	14,000 (2 Surveys)	N/A	WGOA	Sep., Dec.
2002	77,000 (11 Surveys)	N/A	WGOA	Mar, June (
2003	28,000 (4 Surveys)	N/A	WGOA	Mar., June,
2004	14,000 (2 Surveys)	N/A	WGOA	Mar, June
Task 2. Monitor health and diet				
Vessel behavioral surveys	400 ( 300-400 non-pups and 100-0 pups)		WGOA	Quarterly
2001	800 (2 Surveys)	N/A	WGOA	Sep., Dec.
2002	1,600 (4 Surveys)	N/A	WGOA	Mar, June,
2003	1,600 (4 Surveys)	N/A	WGOA	Mar., June,
2004	800 (2 Surveys)	N/A	WGOA	Mar, June
Task 3. Investigate feeding ecology and factors effecting energetic status.				
Scat Collection	400 ( non-pups)	N/A	WGOA	Quarterly
2001	800 (2 Surveys)	N/A	WGOA	Sep., Dec.
2002	1,600 (4 Surveys)	N/A	WGOA	Mar, June,
2003	1,600 (4 Surveys)	N/A	WGOA	Mar., June,
2004	800 (2 Surveys)	N/A	WGOA	Mar, June



Table 2.--Counts of adult and juvenile Steller sea lions at **rookery and haulout trend sites** in seven subareas of Alaska during June and July aerial surveys from 1975 to 1996 (adapted from Sease et al. 1992, 2000, and Strick et al. 1997).

Year	Southeast Alaska	Gulf of Alaska			Aleutian Islands		
		Eastern	Central	Western	Eastern	Central	Western
1975					19,769		
1976		7,053	4,678	8,311	19,743		
1977					19,195		
1979	6,376				36,632	14,011	
1982	6,898						
1985			19,002	6,275	7,505	23,042	
1989	8,471	7,241	8,552	3,908	3,032	7,572	
1990	7,629	5,444	7,050	3,915	3,801	7,988	2,327
1991	7,715	4,596	6,273	3,734	4,231	7,499	2,411
1992	7,558	3,738	5,721	3,720	4,839	6,399	2,869
1994	8,826	3,369	4,520	3,982	4,421	5,790	2,037
1996	8,281	2,131	3,913	3,738	4,714	5,482	2,189
1998	8,693	1,952	3,346	3,361	3,847	5,761	1,913
2000	N/A	1,894	3,117	2,842	3,842	5,427	1,071

## **Curriculum Vitae**

**KATE M. WYNNE**

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### **Education**

December 1977      B.S. Wildlife Resources, University of Idaho, Moscow, ID  
August 1981      M.S. Wildlife Management, University of Maine, Orono, ME

### **Experience**

#### **UNIVERSITY OF ALASKA FAIRBANKS, SCHOOL OF FISHERIES AND OCEAN SCIENCES**

Research Associate Professor July 1996-present (Research Assistant Professor 1990-1996)

Marine Advisory Program Marine Mammal Specialist. Tasks: Work independently and collaboratively with state, federal, and academic biologists to study marine mammal populations and their interactions with fisheries and other human activities. Interpret marine mammal policy and regulations and assist marine resource users and public in their compliance through press releases, written summaries, public meetings, and personal communication. Work closely with Alaska Native hunters, students, and Commissions to involve indigenous peoples in research and management of Alaska's marine mammal resources, including training of hunters and students to collect samples from subsistence-harvested harbor seals. Monitor marine mammal mortality through systematic carcass surveys and as a member of the NMFS Marine Mammal Stranding Network. Encourage accurate marine mammal identification through presentations (public, special user groups, K-12), training of NMFS-funded fisheries observers, and publication of two field guides.

#### **UNIVERSITY OF ALASKA SEA GRANT COLLEGE PROGRAM, FAIRBANKS, AK**

Research Associate May-Nov 1988 • May-Nov 1989

Project coordinator of USFWS-Sea Grant cooperative study of marine mammal interactions with salmon drift gillnetters on the Copper River Delta, AK. Conducted at-sea and interview surveys to document mammal-gear conflicts, flew monthly aerial surveys to determine sea otter abundance and distribution, and surveyed for and necropsied beachcast marine mammal carcasses on the Copper River Delta. Acted as liaison between USFWS/NMFS and fishermen to gather and disseminate information on marine mammal-fishery interactions. Conducted weekly aerial surveys and necropsied large cetaceans in Prince William Sound for NOAA following the Exxon Valdez oil spill. Interpreted new and changing marine mammal regulations for fishermen and the public.

#### **WILDLIFE DEPARTMENT, UNIVERSITY OF MAINE, ORONO, ME**

Faculty Research Associate Aug 1981-1987

Responsible for the design and implementation of NMFS-funded research on marine mammal-fishery interactions in New England waters. Worked directly with commercial fishermen to identify areas of conflicts, acquire the nation's first Small Take Permit, implement and conduct a voluntary gillnet observer program, and collect and sample incidentally taken marine mammals. Captured, tagged, aerially surveyed, and monitored movements of harbor seals in New England.

### **Recent Marine Mammal Research**

Active participant in the survey, capture and/or tagging of

Steller sea lions: Alaska (1991-present); California sea lions: California (1990)

Harbor seals: New England (1981-87); Alaska (1990-present)

Harbor porpoise, large cetaceans: New England (1987), California (1986), Alaska (1991-00)

Sea otters: Alaska (1988)

Weddell seals: Antarctica (1993)

Current research, co-PI: "Availability and use of prey by Steller sea lions in the Kodiak area", PI: "Identification of individual humpback whales in the western Gulf of Alaska".

### Advisory Roles

#### Invited panelist

US House Subcommittee on Fisheries Conservation, Wildlife, and Ocean: invited testimony on the adequacy of NMFS' Steller sea lion research program, Washington DC (May 1999)

Meeting chair: Peer Review of Acoustic Alarm Experiments to Reduce Bycatch of Harbor Porpoise, NMFS/NMML, Seattle WA. (June 1994)

NMFS' Alaska Region Whale Disentanglement Workshop, Sitka AK (Nov 1998)

#### Advisory group appointments

Dept of Commerce's Marine Fisheries Advisory Committee (1999-present)

NMFS' Alaska Regional Scientific Review Group (1995-present)

NMFS' Ballard Locks Pinniped-Steelhead Interaction Task Force (1994-present),

NMFS' National Working Group on Unusual Marine Mammal Mortality (1996-99)

### Selected Publications

Wynne, K.M. and M. Schwartz. 1999. Guide to marine mammals and turtles of the U.S. Atlantic and Gulf of Mexico. URI Sea Grant Pub RIU-H-99-001/UAF Sea Grant Pub MAB-50, Narragansett, RI. 114 pp.

Fall, J.A., V. Vanek, M. Riedel, and K. Wynne. 1999. Community-based harbor seal management and biological sampling. Exxon Valdez Oil Spill Restoration Project Final Report (Restoration Project 97244 and 98244), Alaska Dept of Fish and Game, Division of Subsistence, Anchorage, AK., 31+ pp.

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Fall, J.A., M. Riedel, and K. Wynne. 1997. Community-based harbor seal management and biological sampling. Exxon Valdez Oil Spill Restoration Project Annual Report (Restoration Project 96244), Alaska Dept of Fish and Game, Division of Subsistence, Anchorage, AK., 17pp.

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Lewis, J.P., G.W. Pendleton, K.W. Pitcher, and K.M. Wynne. 1996 Harbor seal population trends in Southeast

- Alaska and the Gulf of Alaska. pp 8-58 in: Annual Report of Harbor Seal Investigations in Alaska. NOAA Grant NA57FX0367. Douglas, AK.
- Wynne, K.M. 1995. The Marine Mammal Protection Act: an overview of recent changes. In D. Mercy and K. Wynne (eds) Amendments to the Marine Mammal Protection Act, Alaska's Marine Resources, 8 (1). [Print run =2000]
- Vanek, V. and K.M. Wynne. 1995. Harbor seal sampling manual. Joint ADFG/NMFS Training Manual. 18 pp. MAP, 900 Trident Way, Kodiak, AK 99615
- Wynne, K.M. 1992. Guide to Marine Mammals of Alaska. Alaska Sea Grant, Marine Advisory Program Bulletin #44, 75pp.
- Wynne, K.M., D. Hicks, and N. Munro. 1992. 1991 Marine mammal observer program for the salmon driftnet fishery of the Prince William Sound, Alaska. Final Rept. to NMFS/AKR, Juneau, AK, 53pp
- Barlow, J.R., W. Baird, J.E. Heyning, K. Wynne, A.M. Manville, L.F. Lowry, D. Hanan, J. Sease, and V.N. Burkanov. 1994. A review of cetacean and pinniped mortality in coastal fisheries along the west coast of the USA and Canada and the east coast of the Russian Federation. pp 405-426 in Gillnets and Cetaceans. Perrin, W.F., G.P. Donovan, and J. Barlow (eds). Rept. to International Whaling Commission, Special Issue 15, 629pp.
- Wynne, K.M. 1991. The marine mammal observer program. In D. Mercy and K. Wynne (eds) Fisheries observer programs. Alaska's Marine Resources 6(3): 8-9.
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- Gilbert, J.R. and K.M. Wynne. 1986. Marine mammal interactions with commercial fisheries in New England, 1985. Ann. Rept, NMFS./NEFC, Contract NA-84-EA-C-00070.
- Wynne, K.M. and J.R. Gilbert. 1985. Investigating marine mammal-fisheries interactions: a special need for communication. Proc. N.E. Fish and Wildlife Conf. 41:36-38.
- Gilbert, J.R. and K.M. Wynne. 1985. Harbor seal populations and fisheries interactions with marine mammals in New England, 1984. NMFS/NEFC Contracts NA80FAC00029.
- Gilbert, J.R. and K.M. Wynne. 1983. Harbor seal pupping sites and summer movements of young in New England. (Wynne presented paper) Fifth Biennial Conference on the Biology of Marine Mammals, Boston, MA.

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## EDUCATION

<b>Masters of Marine Affairs</b>	1995	University of Washington	Seattle, WA
<b>Bachelors of Arts -- Biology</b>	1991	University of Puget Sound <i>Phi Beta Kappa</i>	Tacoma, WA

## EXPERIENCE

<b>Chief Resource Analyst</b>	1998-2001	Aleutians East Borough	Juneau, AK
Analyze federal and state fishery management affecting fishery dependent communities Review and critique NEPA, ESA, M-SFCMA, MMPA, RFA, and State of Alaska documents Develop and advocate stakeholder positions on federal, state, and tribal fishery management issues Provide technical testimony to regulatory bodies, congressional staff, and industry participants Coordinate scientific research programs, and governmental, press, and industry relations			
<b>Research Associate</b>	1997-1998	National Research Council	Washington, DC
Coordinate and facilitate scientific review programs with \$1 million budget Draft, edit, and produce reports on resource management for congress including: Reviews of IFQ programs and fishery stock assessment Organize and conduct hearings, workshops, and briefings Develop research study prospectuses, identify and obtain project funding, oversee budgets			
<b>Sea Grant Legislative Fellow</b>	1996	United States Senate	Washington, DC
Draft, edit, and review legislation for Senate Commerce Committee Develop fishery resource legislation, including the Sustainable Fisheries Act and MMPA Brief members of congress, press, and stakeholders on legislation Coordinate and facilitate relationships with constituents, federal agencies, and congressional staff			
<b>Principal Investigator</b>	1995	Washington Dept. of Ecology	Bayview, WA
Design and conduct field research on seagrass ecology at Padilla Bay Estuarine Research Reserve Analyze and present findings to other researchers Publish technical memorandum			
<b>Teaching Assistant</b>	1993-1995	University of Washington	Seattle, WA
Organize and lead laboratory and class activities in the Biology and Zoology Department Courses include: Ecology, Animal Physiology and Development, and Botany			
<b>Biological Observer</b>	1992	Alaskan Observers, Inc.	Seattle, WA
Gather biological data onboard fishing vessels for use in federal fishery management Serve aboard onshore and offshore vessels in the North Pacific and Pacific Council regions			

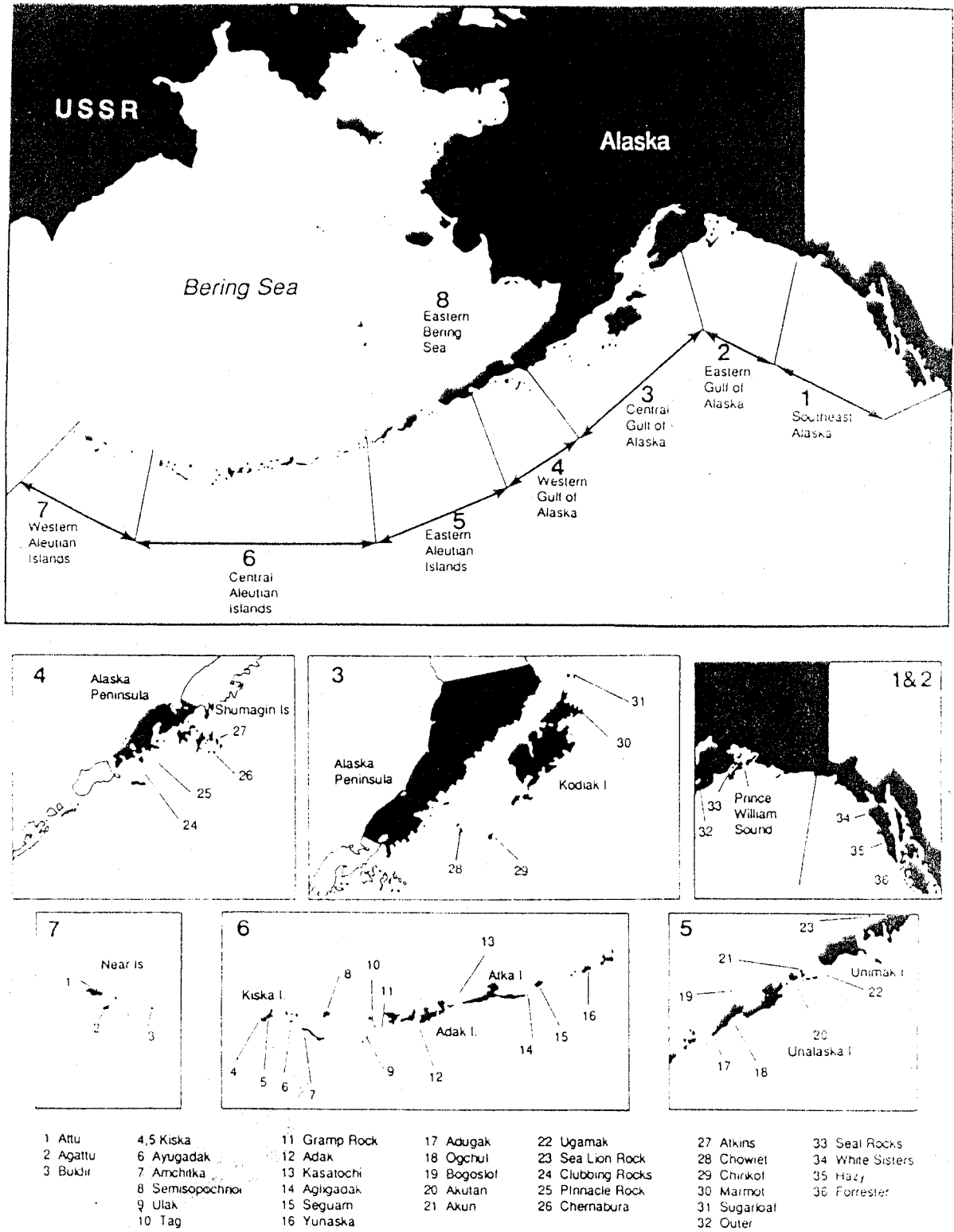


Figure 1.--Eight regions of Alaska showing major Steller sea lion rookeries, as modified from Merrick et al. (1987).